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RESEARCH

Simulated Social Network Interventions to Promote Physical Activity: Who should be the Influence Agents?

Thabo J van Woudenberg[1*†], Bojan Simoski[2†], Eric Fernandes de Mello Araújo[2], Kirsten E Bevelander[1], William J Burk[1], Crystal R Smit[1], Laura Buijs[1], Michel Klein[2] and Moniek Buijzen[1]

ISBNPA 2019
Prague

VU UNIVERSITY AMSTERDAM

Radboud University

Moniek Buijzen

PRINCIPAL INVESTIGATOR

Kris Bevelander

RESEARCH COORDINATOR

William Burk

STATISTICAL ANALYSIS EXPERT

Thabo van Woudenberg

PHD - PHYSICAL ACTIVITY

Radboud Universiteit

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Crystal Smit

PHD - NUTRITION

Laura Buijs

PROJECT COORDINATOR

Esther Rozendaal

PROJECT ADVISOR

Rebecca de Leeuw

PROJECT ADVISOR

VU UNIVERSITY AMSTERDAM

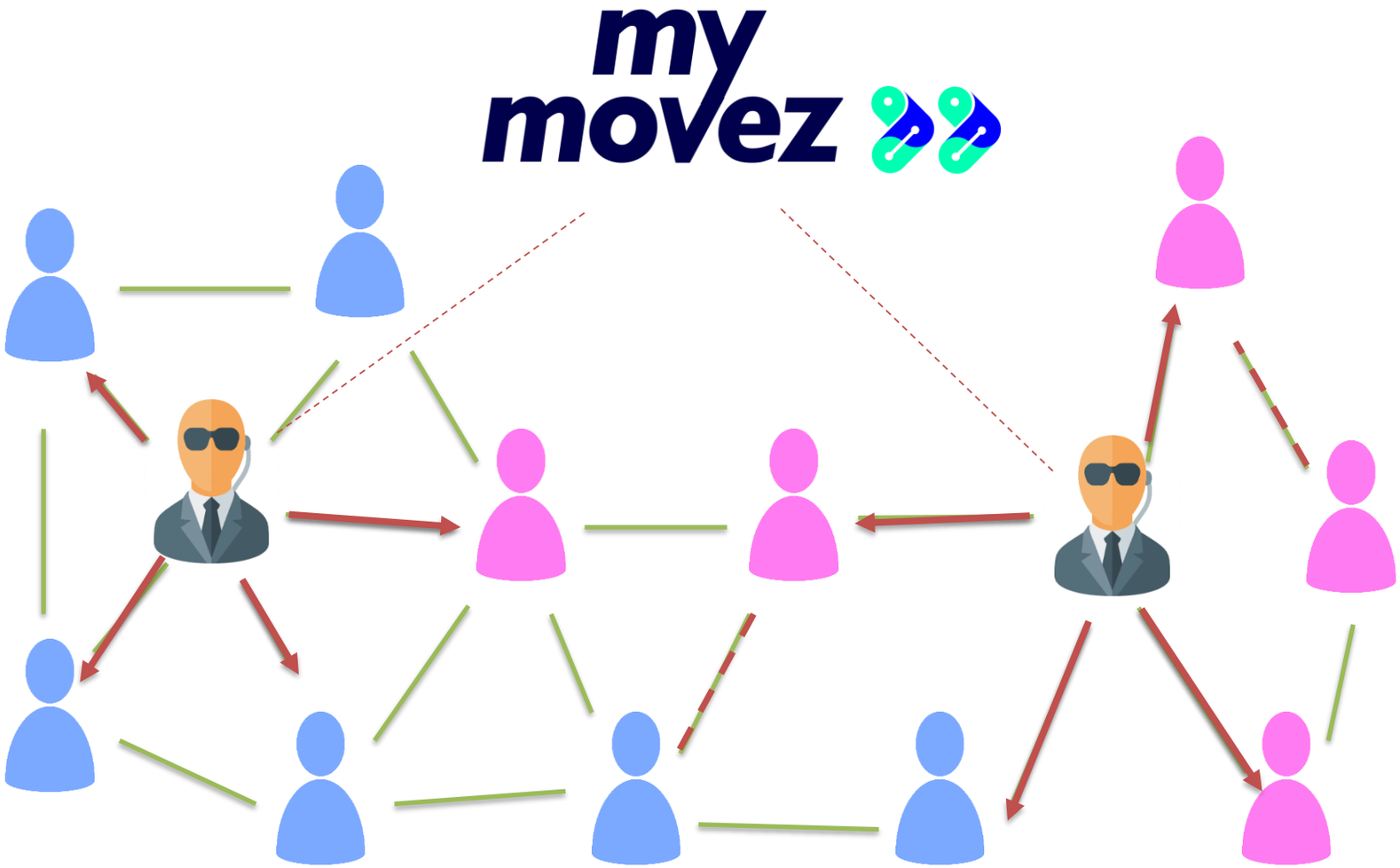
Social AI

Eric Araújo

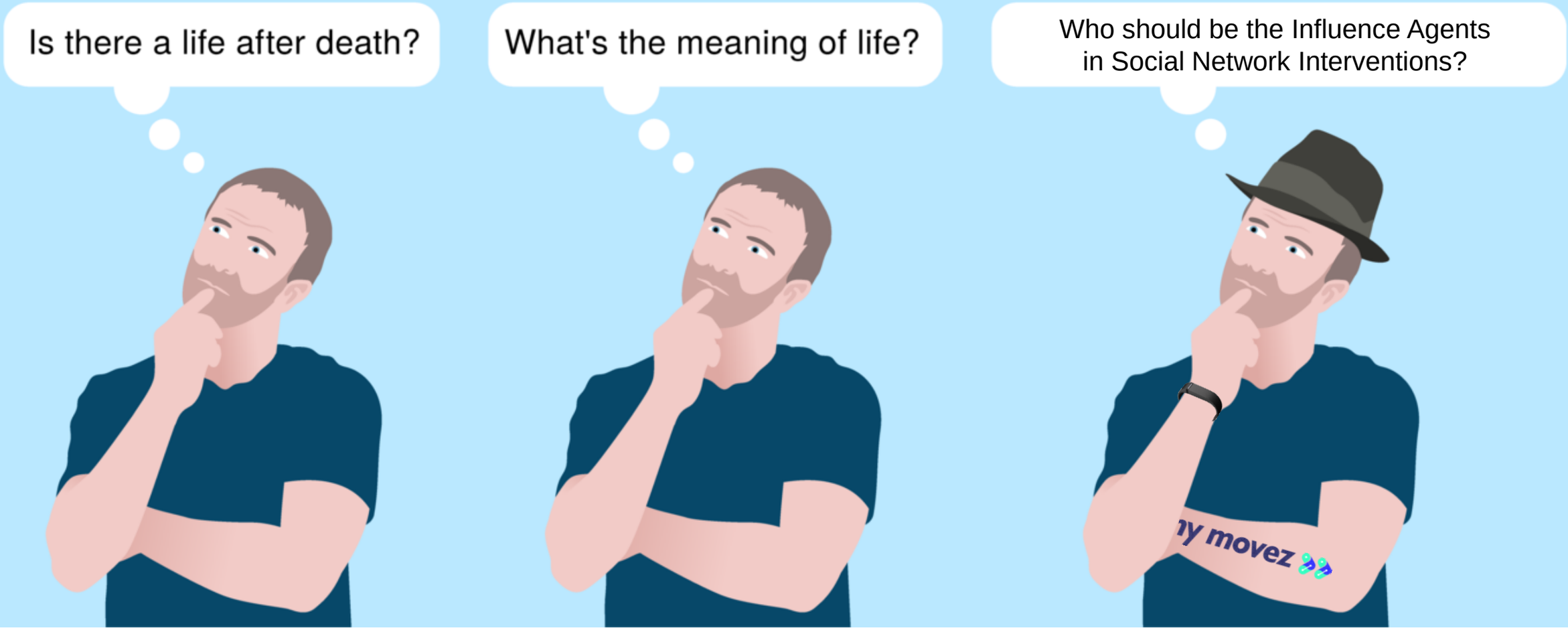
Bojan Simoski

Michel Klein

Social network intervention



THE BIG QUESTIONS IN LIFE



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REVIEW

Network Interventions

Thomas W. Valente

+ See all authors and affiliations

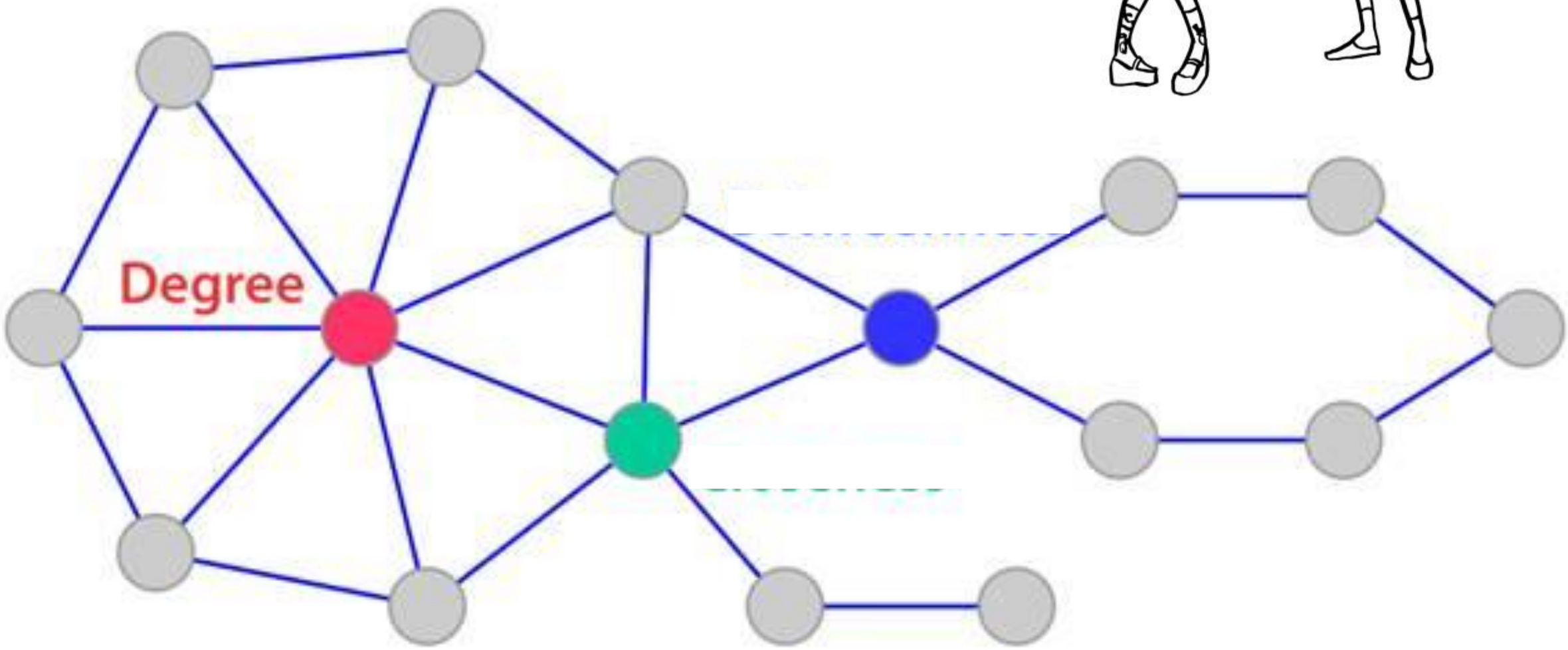
Science 06 Jul 2012:
Vol. 337, Issue 6090, pp. 49-53
DOI: 10.1126/science.1217330

Abstract

The term “network interventions” describes the process of using social network data to accelerate behavior change or improve organizational performance. In this Review, four strategies for network interventions are described, each of which has multiple tactical alternatives. Many of these tactics can incorporate different mathematical algorithms. Consequently, researchers have many intervention choices at their disposal. Selecting the appropriate network intervention depends on the availability and character of network data, perceived characteristics of the behavior, its existing prevalence, and the social context of the program.

With who do you hang out during the breaks?

What is the best selection criterion?

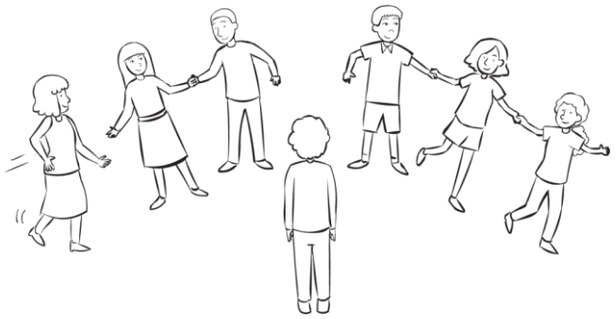


Comput Math Organiz Theor (2006) 12: 21–34
DOI 10.1007/s10588-006-7084-x

Identifying sets of key players in a social network

Stephen P. Borgatti

Betweenness

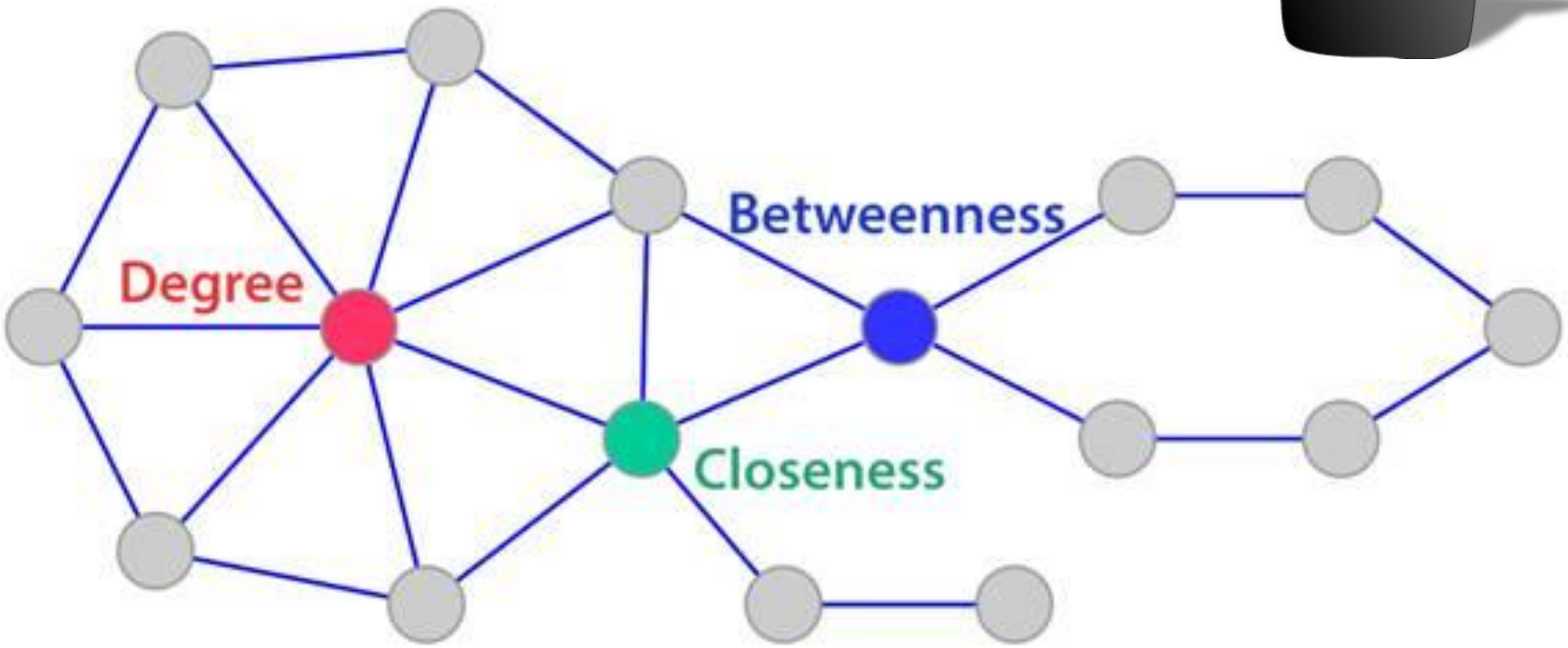


shortest link between other peers

LEVELS of Closeness

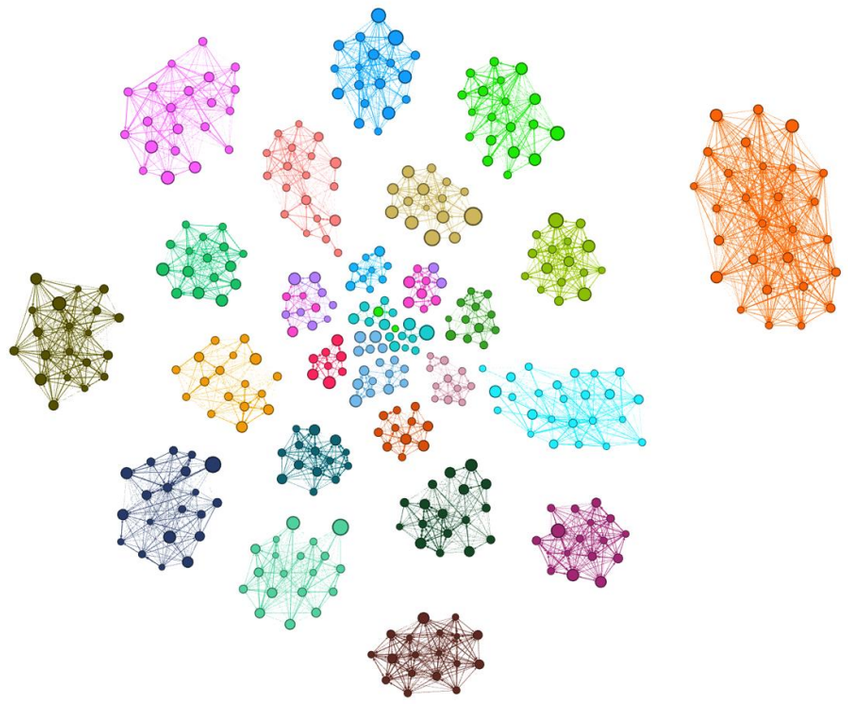
shortest distance to all other peers

What is the best selection criterion?



Aim of the study

- To deterime the most effective selection criteron to select influence agents
- Not feasable in a field study, to many participanting classrooms needed
- Simulations based on Agent Based Models!



Conditions

In-degree	Betweennes	Closeness	Random	Control

- In-degree central agents
- Betweenness central agents
- Closeness central agents

} Bases on centrality

- Random agents (100 samples + simulations per class)

- No intervention (control condition)

Data from the *MyMovez* project

MyMovez						
Phase	Phase I				Phase II & III	
Year	2016			2017	2018	
Wave	1	2	3	4	5	6 - 7
Month	February	April	June	February	February	Intervention

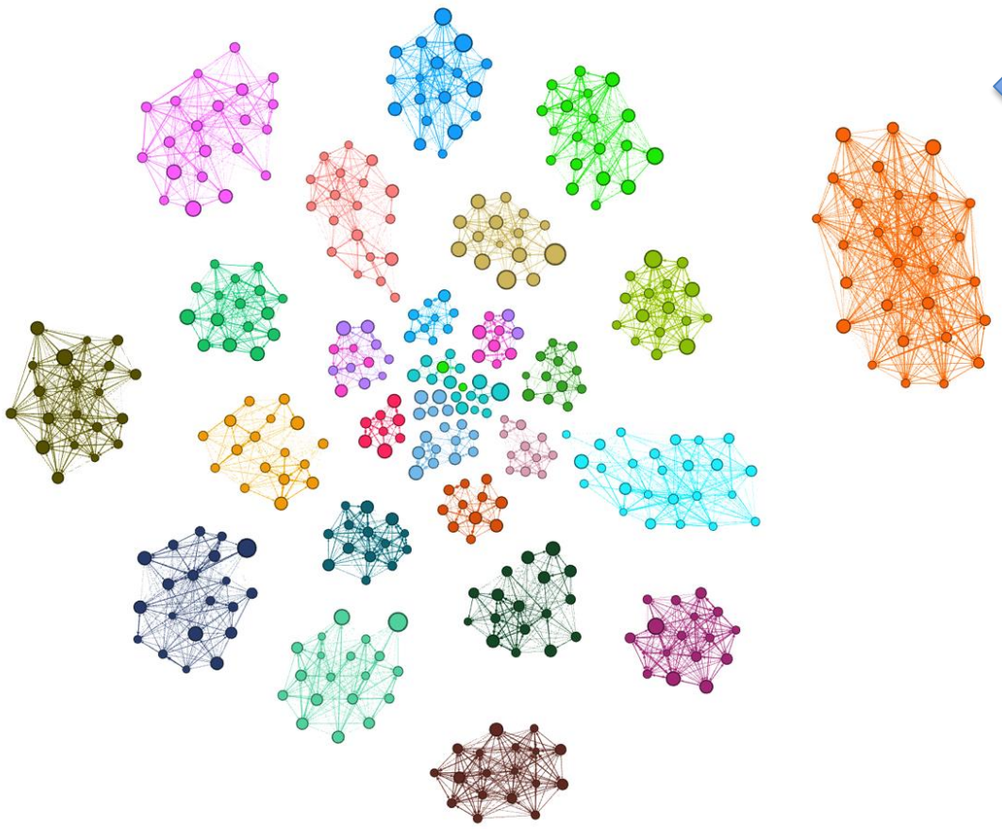
- Data collection W1 – W4 (N = 953)

- Measures:
  - Physical activity
  - Social network
  - Family affluence

Intervention

- Influence agents (top 15% per class) received an artificial increase in PA of 17%
- Run simulations based on the contagion model for 1 year (day 0-364)
- Success rate = percentage increase in average physical activity of the class

Contagion model



Using Simulations for Exploring Interventions in Social Networks
Modeling Physical Activity Behaviour in Dutch School Classes

Eric Fernandes de Mello Araújo[1], Bojan Simoski[1], Thabo van Woudenberg[2], Kirsten Bevelander[2], Crystal Smit[2], Laura Buijs[2], Michel Klein[1] and Moniek Buijzen[2]

[1]*Behavioural Informatics Group, Vrije Universiteit Amsterdam, Amsterdam, The Netherlands*

[2]*Behavioural Science Institute, Radboud University, Communication Science, Nijmegen, The Netherlands*
{*e.araujo, b.simoski*}*@vu.nl*, {*t.vanwoudenberg, k.bevelander, c.smit, l.buijs*}*@bsi.ru.nl, michel.klein@vu.nl, m.buijzen@bsi.ru.nl*

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SSM - Population Health
Volume 3, December 2017, Pages 211-218
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Article

Comparing methods of targeting obesity interventions in populations: An agent-based simulation

Rahmatollah Beheshti [a], Mehdi Jalalpour [b], Thomas A. Glass [c]

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https://doi.org/10.1016/j.ssmph.2017.01.006

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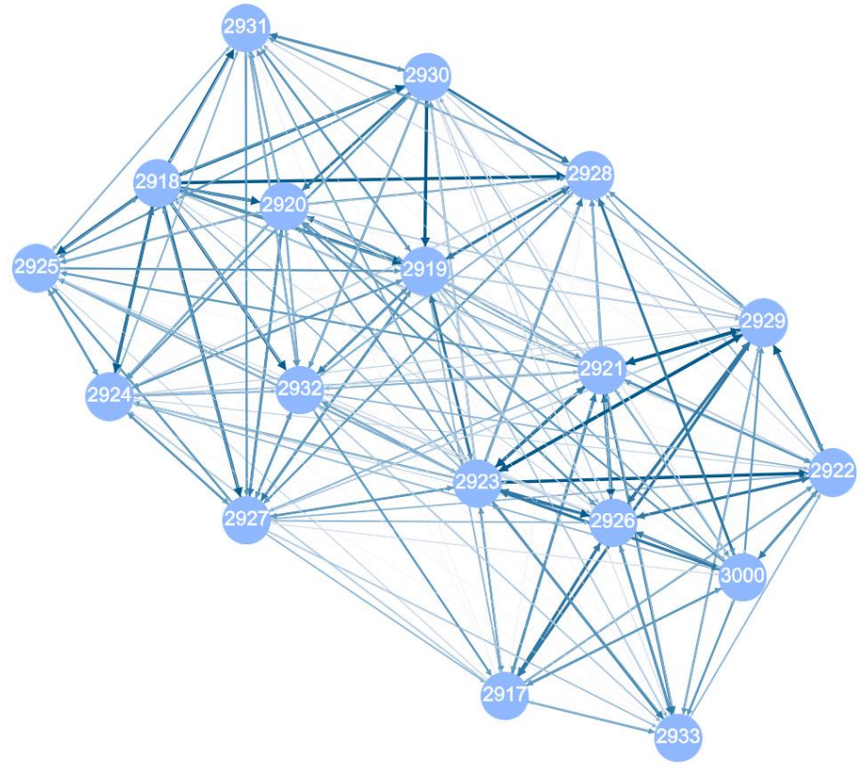
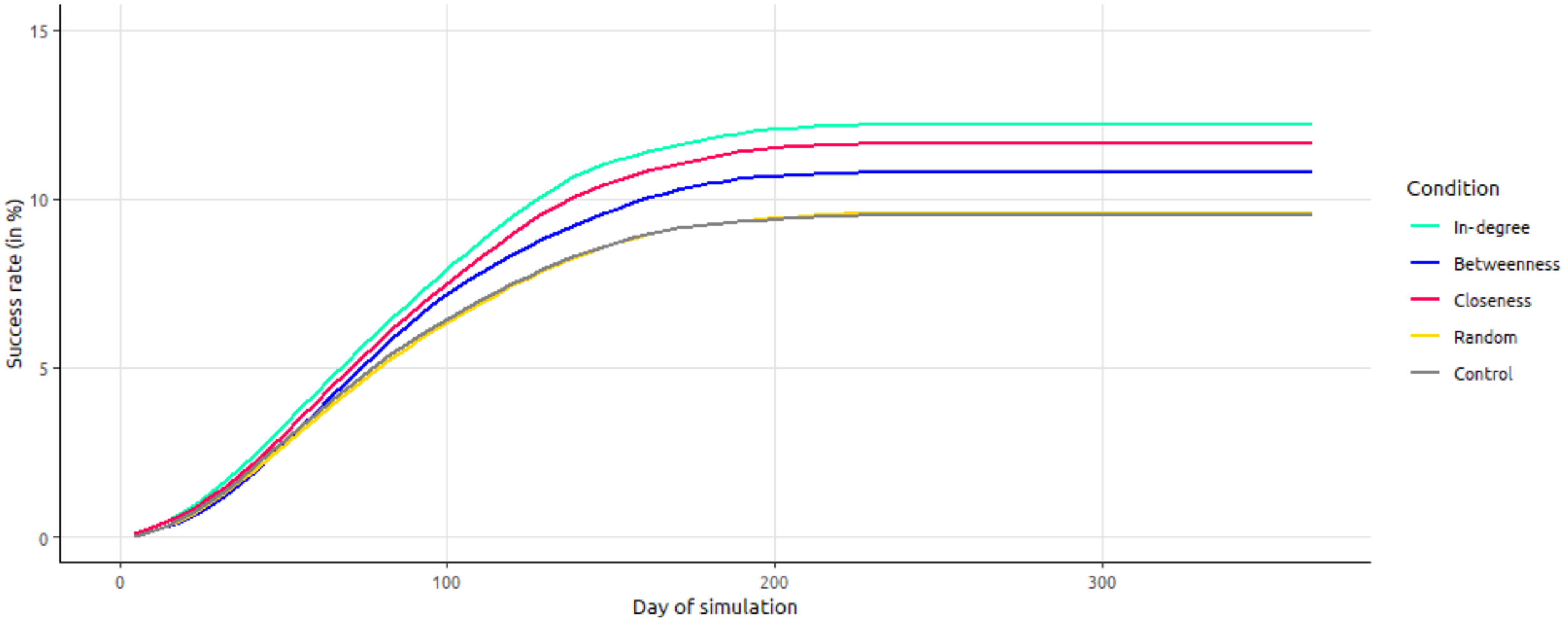


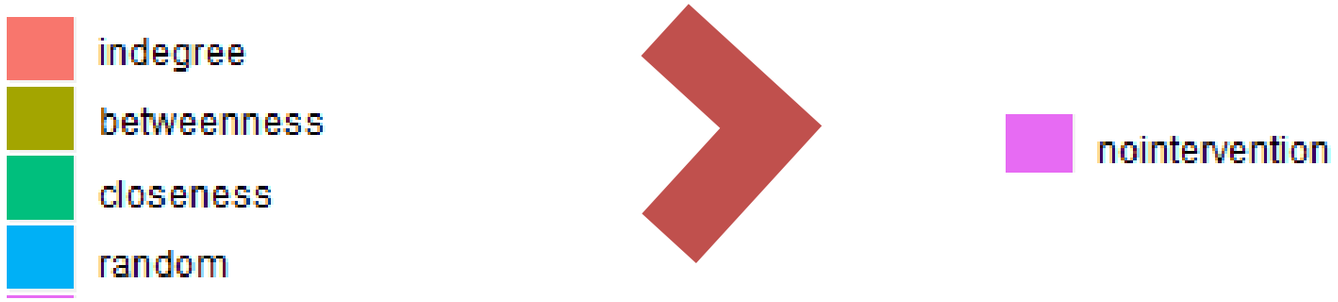
Current study

Radboud University


Success rate (in %)
15
10
5
0
0
100
200
300
Day of simulation
Condition
In-degree
Betweenness
Closeness
Random
Control

Results

- H1: Social network interventions are effective



- H2: Central agents is better than random agents

- H3: Betweenness and Closeness are better than in-degree centrality

Conclusions

- Agent Based Models seem a valid tool to model the spread of physical activity in classrooms
  - Interventions increased more than the control conditions

- Strategically selecting influence agents is better than random agents
  - In-degree or closeness centrality result in biggest increase in PA

Discussion

- Simulated an artificial increase in PA.
  - But influence agents can perform other roles.

- All conditions increase in PA.
  - Collaborators will look further into including parameters that model the decline of physical activity (e.g. age, season etc.)

- Contagion model was specified by merging data of 4 waves
  - Collaborators will look further into specifying model based on effects per wave.

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T.vanwoudenberg@bsi.ru.nl

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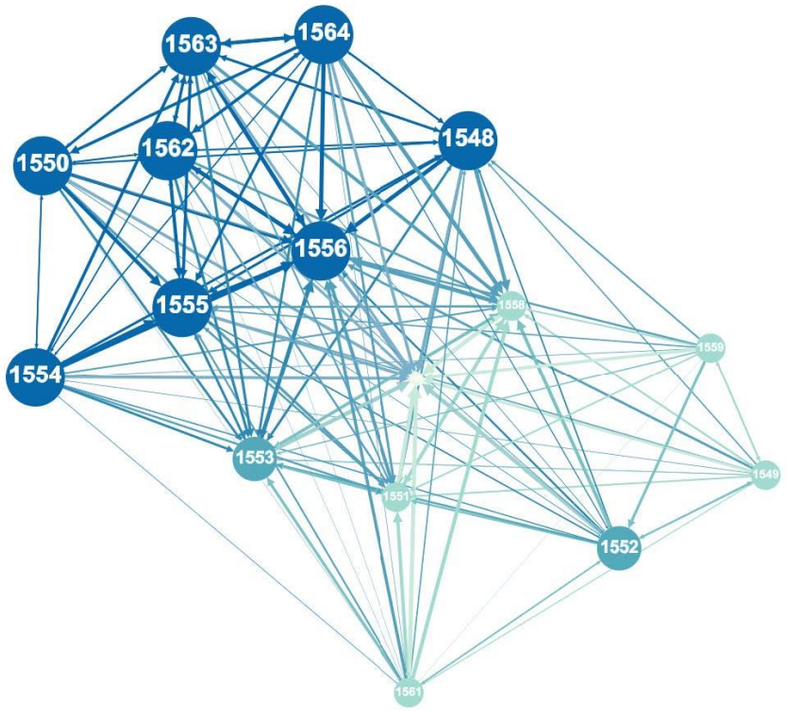
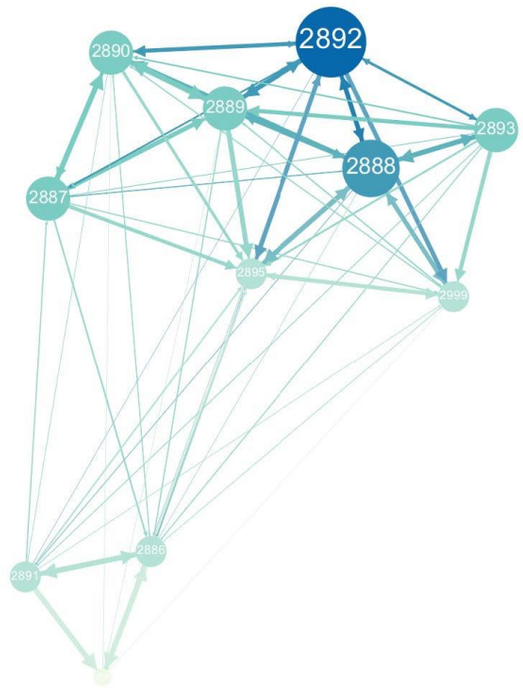
Centralization: The tendency of a single individual to be more central than all the other individuals in the social network.

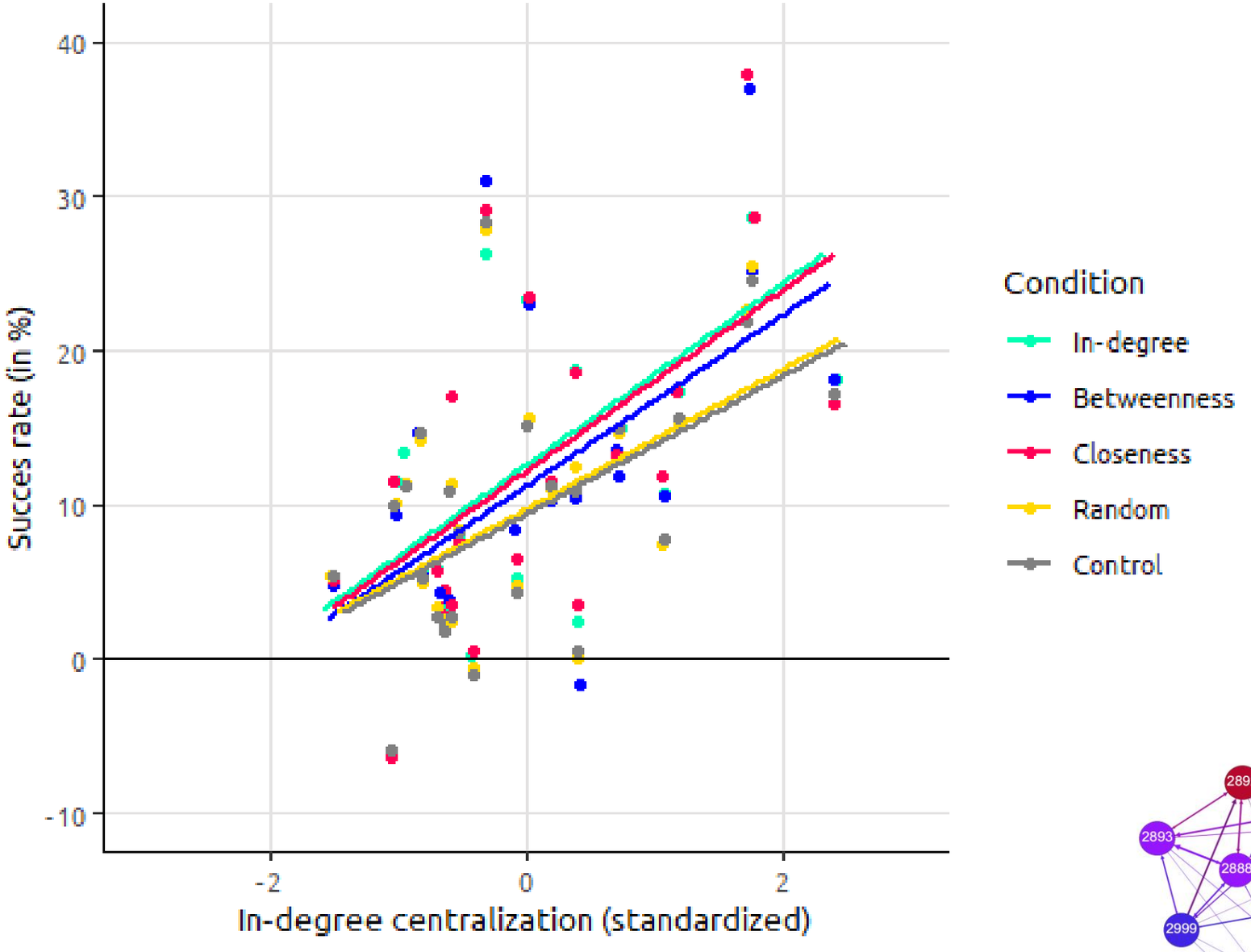


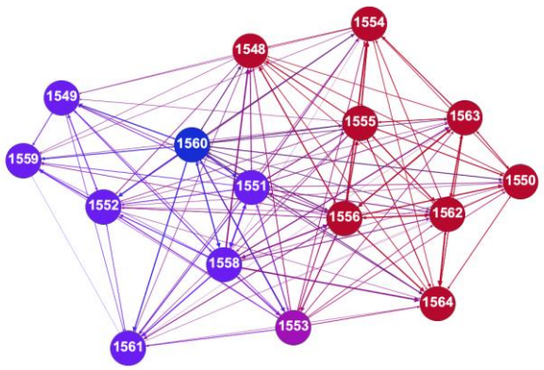
Low centralization



High centralization

- H4: Social network interventions work better in centralized classrooms


Succes rate (in %)
40
30
20
10
0
-10
-2
0
2
In-degree centralization (standardized)
Condition
In-degree
Betweenness
Closeness
Random
Control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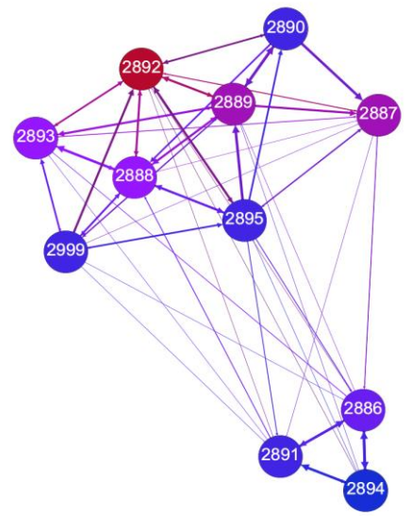
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